IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Bogdan C. Maglich	Group Art Unit 3663
Appl. No.	:	09/883,851	
Filed	:	June 18, 2001	
For	:	METHOD AND APPARATUS FOR NEUTRON MICROSCOPY WITH STOICHIOMETRIC IMAGING	
Examiner	:	Daniel Lawson Greene	

DECLARATION OF BOGDAN C. MAGLICH, PH.D. PURSUANT TO 37 C.F.R. § 1.132

Mail Stop AF
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

I, Bogdan C. Maglich, Ph.D., declare as follows:

1. I am the sole inventor of the claimed subject matter of the above-captioned patent application.

2. I have achieved a Ph.D. in high-energy physics and nuclear engineering from the Massachusetts Institute of Technology (MIT), a Master of Science degree from England's University of Liverpool, and a Bachelor of Science degree from the University of Belgrade. I have served as a Professor of Physics at the University of Pennsylvania and at Rutgers University, and on the joint faculty of the Princeton-Penn Accelerator Laboratory. I have also served as a research team leader at the CERN European Center for High Energy Physics in Geneva, Switzerland, and as a team leader at the U.S. National Laboratories: Berkeley, Brookhaven, Argonne, and Fermilab. I have also been the principal investigator at the Air Force Weapons Laboratory (now known as the Air Force Phillips Laboratory) and a scientific director of the British-Swedish-American Consortium for the design of the King Abdulaziz Energy Research Center of Saudi Arabia.

3. Throughout my professional life, I have been involved in the detection of micro-effects with extremely low signal-to-noise ratios, the so-called "needle in the haystack" problem. My work in particle physics, instrumentation, and detection devices have resulted in the discovery of four new elementary particles, and I am co-inventor to a patent to the non-radioactive nuclear power production process, also known as "aneutronic" nuclear energy. My most recent work has been on systems and methods for noninvasive stoichiometric detection and imaging of concealed illicit substances, such as anthrax, chemical weapons, and explosives, using gamma rays produced by neutron irradiation.

4. I am currently Chief Executive Officer and Chief Scientific Officer of the assignee of the above-captioned patent application, HiEnergy Technologies, Inc. I have been the Principal Investigator on numerous Small Business Innovation Research (SBIR) Program grants from the U.S. Department of Defense since 1996 directed towards the development of chemically-specific, direct, real-time detection systems to be used in various contexts (*e.g.*, detecting explosives, such as landmines) by analyzing gamma rays produced by neutron irradiation of the material under analysis.

5. I have reviewed the pending claims of the above-captioned patent application and the August 19, 2005 Final Office Action in the above-captioned patent application. I have also reviewed the May 1998 publication "Associated Particle Imaging (API)," from Bechtel Nevada Special Technologies Laboratory ("the Bechtel reference") cited by the Examiner in rejecting Claims 1-17 under 35 U.S.C. § 102(b). I have also reviewed the documents listed in Form PTO-892 attached to the August 19, 2005 Final Office Action and cited by the Examiner in rejecting Claims 1-17 under 35 U.S.C. § 102(f), including the Bechtel reference, A. Beyerle *et al.*, "*Design of an associated particle imaging system*," Nuclear Instruments and Methods in Physics Research, Volume A299, 1990, pages 458-462 ("the Beyerle reference") and the article "*HiEnergy Technologies, Inc. (HIET) company interview*," The Wall Street Transcript, April 4, 2005 ("the HIET article").

6. Claim 1 of the above-captioned application recites a system having (emphasis added) "a particle generator ... generating a plurality of first subatomic particles and a plurality of second subatomic particles **at a target position which is a first distance from the material to be analyzed**," and "**a particle detector array ... at a second distance from the target position, the second distance being larger than the first distance**." As recited by Claim 1, the target

position (at which the subatomic particles are generated) is **closer** to the material to be analyzed than to the particle detector array. Similarly, Claim 5 recites a system having the target position **closer** to the chemical substance being detected and imaged than to the particle detector array. Similarly, Claim 26 recites a system in which the trajectories of the first subatomic particles propagating from the target position to the chemical substance are **shorter** than the corresponding trajectories of the second subatomic particles propagating from the target position to the particle detector array. As described in the above-captioned patent application (*see, e.g.*, Figure 18 and page 23, line 26 – page 25, line 22), such configurations advantageously provide a magnification effect which is not attainable in prior art systems.

7. Appendix A of this declaration is a photograph taken on August 5, 2005 of a configuration designed to reduce to practice the magnification effect in a proposed Stage II of a Cooperative Agreement between the assignee of the above-captioned patent application, HiEnergy Technologies, Inc., and the U.S. Transportation Security Administration (Stage I of the Cooperative Agreement having recently been completed). The white bar at the right of the photograph identifies the location of the particle detector array. The red dot at the left of the photograph identifies the location of the material to be analyzed. The white lines (labeled "α") extending from an intersection point (the target position) to the particle detector array identify exemplary trajectories of the alpha particles from the target position which impinge the particle detector array. The white lines (labeled "*n*") extending from the target position to the material to be analyzed identify exemplary trajectories of the neutrons from the target position corresponding to the alpha particles which impinge the particle detector array. The photograph illustrates that by having the target position closer to the material to be analyzed than to the particle detector array (e.g., by a factor of 4), a magnification effect is produced (e.g., a magnification of 400%).

8. The associated particle imaging (API) system disclosed by the Bechtel reference does not disclose all the limitations of Claims 1 or 5 of the above-captioned patent application. For example, the Bechtel reference only discloses systems which have the target position **farther** from the material (or chemical substance) being analyzed than from the particle detector array (*see, e.g.*, Figures 1 and 8 of the Bechtel reference). Configurations such as those disclosed by the Bechtel reference cannot provide a magnification effect, and the Bechtel reference is silent regarding the possibility or desirability of such a magnification effect. Thus, the Bechtel reference does not disclose or suggest the system recited by Claims 1 or 5.

9. None of the other patents or non-patent literature listed on the Form PTO-892 attached to the August 19, 2005 Final Office Action discloses or suggests the limitations of Claims 1 or 5 of the above-captioned patent application which are not disclosed or suggested by the Bechtel reference. For example, in contrast to the structure recited by Claims 1 and 5 of the above-captioned patent application, all the associated particle imaging (API) systems purported to be disclosed by these references have the target position **farther** from the material being analyzed than from the particle detector (*see, e.g.*, Figure 2 of "*Current Status of the Associated Particle Imaging System at STL*," J.P. Hurley *et al.*, January 10, 1992; Figure 1 of the Beyerle reference; Figure 1 of "*Data Simulation for the Associated Particle Imaging System*," L.N. Tunnell, EGG 11265-3007 UC-905, June 2, 1994). Configurations such as those disclosed by these other patents and non-patent literature cannot provide a magnification effect, and these other patents and non-patent literature are silent regarding the possibility or desirability of such a magnification effect. Thus, these other patents and non-patent literature do not disclose or suggest the system recited by Claims 1 or 5.

10. In particular, the Beyerle reference at page 459, column 2, lines 11-12 states that "the alpha detector ... will be ... 10 cm from the target," and at page 461, column 2, caption of Figure 5 that "the test objects are ... 1 m from the neutron source." Thus, contrary to the Examiner's assertion that the Beyerle reference reports "a seemingly identical system as the instant invention," the Beyerle reference does not disclose or suggest all the limitations of the claimed invention recited by Claims 1 or 5. Configurations such as those disclosed by the Beyerle reference cannot provide a magnification effect, and the Beyerle reference is silent regarding the possibility or desirability of such a magnification effect. Thus, the Beyerle reference does not disclose or suggest the system recited by Claims 1 or 5.

11. I independently conceived of the invention recited by the pending Claims 1-17 and 26-30 of the above-captioned patent application on my own, with no contributions from others.

12. Claims 1-17 and 26-30 of the above-captioned patent application are directed to a neutron microscope which uses the magnification effect to magnify and discern chemically-specific features detected within a material being analyzed. Such a system can be extremely useful in various contexts. For example, in the semiconductor industry, the neutron microscope can be used during wafer inspection to detect and image distributions of dopants and impurities.

As another example, in biotechnology, the neutron microscope can be used in the analysis and imaging of micro-quantities of extraneous chemical elements and compounds in various types of samples, including but not limited to blood, bacteria, DNA, and RNA. As still another example, in gemology, the neutron microscope can be used in the analysis and imaging for identification and "fingerprinting" of gems (*e.g.*, diamonds, sapphires, emeralds) which have different inclusions of metals depending on their provenance. While the neutron microscope has some elements in common with other systems I have invented (for example, U.S. Patent Application No. 09/778,736) which analyze gamma rays produced by neutron irradiation to detect explosives, the neutron microscope has features and capabilities not previously obtained.

13. None of the other patents or non-patent literature listed on the Form PTO-892 attached to the August 19, 2005 Final Office Action disclose or refer to such a neutron microscope. For example, the HIET article mentions some of my early activities in 1997 with two other scientists, Charles Powell and Albert Beyerle, employed by HiEnergy Microdevices, Inc. (the precursor of the assignee of the above-captioned patent application, HiEnergy Technologies, Inc.) to reduce to practice and commercialize other inventions (*e.g.*, stoichiometric detection of landmines), not the neutron microscope recited by Claims 1-17 and 26-30 of the above-captioned patent application. The other patents and non-patent literature cited by the Examiner are all completely silent on a neutron microscope as recited by Claims 1-17 and 26-30 of the above-captioned patent application.

14. To the extent that the activities mentioned in the HIET article could be considered to be related to common elements between the claimed invention of the above-captioned patent application and my other inventions, the contributions by Charles Powell and Albert Beyerle were limited to specific measurements assigned to them by me towards reduction to practice and commercialization activities with regard to these common elements. In addition, in my position as Chairman of the Board and Chief Scientist of HiEnergy Microdevices, Inc., these specific measurements by Charles Powell and Albert Beyerle were conducted under my direction and control. Besides me, none of the other personnel involved in these activities (including Charles Powell and Albert Beyerle) contributed to the conception of the claimed invention of the above-captioned patent application.

15. It has long been my practice to acknowledge the contributions of all individuals who participated in my experiments or other activities, for example by including their names as

co-authors of technical papers, regardless of whether these individuals contributed to the conception of any inventions. This practice of acknowledging everyone as co-authors, including those who only participated in taking measurements and did not contribute to the conception of any inventions, is ingrained in me from my long academic career in particle physics in which the whole team is acknowledged as co-authors as a courtesy, regardless of questions of inventorship. A particular example of my practice was described by Nobel Laureate Prof. Luis W. Alvarez in his Nobel Lecture presented on the occasion of his receiving the Nobel Prize for Physics in 1968, in which he described my discovery of the ω meson as follows (Luis W. Alvarez, "*Recent developments in particle physics*," Nobel Lecture, December 11, 1968, in Nobel Lectures, Physics 1963-1970, Elsevier Publishing Co., Amsterdam, 1972):

> The first success came to Bogdan Maglić, a visitor to our group, who analyzed film from the 72-inch chamber's antiproton exposure. He made the important decision to concèntrate his attention on proton-antiproton annihilations into five pions – two negative, two positive, and one neutral. ... Although Bogdan Maglić originated the plan for this search, and pushed through the measurements by himself, he graciously insisted that the paper announcing his discovery should be co-authored by three of us who had developed the chamber, the beam, and the analysis program that made it possible.

My statements and writings which acknowledge the participation of other individuals in my projects, such as in the HIET article, must not be interpreted as an admission that these individuals contributed to the conception of any inventions resulting from these projects.

16. The HIET article also mentions that in collaboration with various other entities (University of California at Berkeley, the Department of Energy and two other companies, including E,G&G Ortec), we were able to show deciphering of the chemical formulas of substances without analog chemistry to the government. This collaboration was directed towards "proof of concept" activities such as reduction to practice and commercialization for another invention besides the neutron microscope as recited by Claims 1-17 and 26-30 of the above-captioned patent application.

17. To the extent that this collaboration mentioned in the HIET article could be considered to be related to common elements between the claimed invention of the above-captioned patent application and my other inventions, the role of these other entities in this collaboration was limited to providing funding, equipment, and/or performing specific measurements under my direction and control with regard to these common elements. Besides

me, none of the other personnel involved in these activities contributed to the conception of the claimed invention of the above-captioned patent application.

18. For example, under a "Work for Others" agreement entered into between HiEnergy Microdevices, Inc. and the U.S. Department of Energy in 1997 ("the WFO agreement," a copy of which is attached hereto as Appendix B), HiEnergy Microdevices, Inc. paid approximately $52,000.00 for access to the facilities of the Bechtel Nevada Special Technologies Laboratory (STL) in Santa Barbara, California for "proof of concept" measurements specified by me with regard to a particular embodiment of a landmine detection system (referred to as "MineBuster"). The WFO agreement identifies the scope of the specific measurements identified by me to be performed as follows (see Appendix A and Amendment No. 5 of the WFO agreement):

> The Contractor, Bechtel Nevada Special Technologies Laboratory, will perform the following unclassified task:
>
> > Measure the gamma response of various neutron activated elements and combinations of elements that are important to mine detection in typical soils. Determine detection sensitivities of pertinent elements in soils under a variety of experimental conditions such as moisture content.
> >
> > Analyze the results and write an informal summary report.
>
> The Contractor, Bechtel Nevada / Special Technologies Laboratory, will perform the following unclassified task entitled "Material Detection via Gamma Response":
>
> > Measure the gamma response of various materials and combinations of materials using a neutron beam from Sealed Tube Neutron Generator (STNG) tube. Determine detection sensitivities of pertinent materials under a variety of experimental conditions.
> >
> > Analyze these results and write an informal summary report.

These specific measurements were actually performed by personnel of HiEnergy Microdevices, Inc. These measurements used only a single alpha particle detector, that is, one pixel, so imaging could be obtained only by physically scanning the alpha particle detector by changing its angle. Because these measurements were performed in a restricted area using the facilities of the STL, the HiEnergy Microdevices personnel were hosted or chaperoned by STL personnel while performing these measurements. This hosting was the full extent of the contribution to the work performed by STL personnel under the WFO agreement.

19. Under Article XIV, Section 4A of the WFO agreement, HiEnergy Microdevices, Inc. ("the Sponsor" under the WFO agreement) was obligated to report to the U.S. Government any Subject Inventions (i.e., inventions "conceived in the course of or under this Agreement, or, in the case of an invention previously conceived by the Sponsor, first actually reduced to practice in the course of or under this Agreement") in order to retain title to these Subject Inventions. There were no such inventions conceived or first reduced to practice under the agreement, so we did not make any such reports to the U.S. Government.

20. Furthermore, under Article XIV, Section 4B of the WFO agreement, STL personnel, including J. Paul Hurley and James Tinsdale, of the U.S. Department of Energy ("the Government" under the WFO agreement) were obligated to report and disclose to HiEnergy Microdevices, Inc. any Subject Inventions made under the WFO agreement by STL personnel. I have received no such reports or disclosures from STL personnel, indicating that STL personnel have not made any Subject Inventions.

21. As another example, under an agreement entered into between HiEnergy Microdevices, Inc. and the Regents of the University of California as contractor to the U.S. Department of Energy in 1997 ("the DOE agreement," a copy of which is attached hereto as Appendix C), HiEnergy Microdevices, Inc. paid $6,254.00 for specific measurements identified by me to be performed by Dr. Michael R. Maier of the E.O. Lawrence Berkeley National Laboratory (LBNL). The "Statement of Work" of the DOE agreement identifies the scope of the measurements to be performed as follows:

> Determine by laboratory measurements the dependence of gamma energy resolution of the N-type (neutron resilient) High Purity Germanium Detectors (HPGD) at the extremely high counting rate as a function of throughput in gamma counting rate using high-intensity Cobalt-60 source, and as a function of shaping time (from 10 to 2 microseconds). HPGD to be used is 80% efficient, 70 mm diameter, 80 mm long.
>
> Determine by laboratory tests the stability of gamma energy "window" of the same HPGD at the extremely high counting rate as a function of throughput in gamma counting rate.
>
> Determine by laboratory tests changes by absorption of gamma ray peaks in passage through 20 cm of soil (land mine depth).

These specific measurements are the full extent of the work performed by Dr. Maier under the DOE agreement.

22. Under Clause V, Sections C(2) and D(1) of the DOE agreement, HiEnergy Microdevices, Inc. ("the Sponsor" under the DOE agreement) was obligated to report to the U.S. Government any Subject Inventions (i.e., inventions "conceived in the course of or under this agreement, or, in the case of an invention previously conceived by the Sponsor, first actually reduced to practice in the course of or under this agreement") in order to retain title to these inventions. There were no such inventions conceived or first reduced to practice under the DOE agreement, therefore no such reports were made to the U.S. Government.

23. Furthermore, under Clause V, Section D(2) of the DOE agreement, LBNL personnel, including Dr. Maier, of the University of California ("the Facility Operator" under the DOE agreement) were obligated to report and disclose to HiEnergy Microdevices, Inc. any Subject Inventions made under the DOE agreement by LBNL personnel. I have received no such reports or disclosures from LBNL personnel, indicating that LBNL personnel have not made any Subject Inventions.

24. In my position as Chief Scientist for HiEnergy Microdevices, Inc. at the time of these two agreements, these specific measurements performed at STL and at LBNL under these two agreements were conducted under my direction and control. The HiEnergy Microdevices personnel merely used equipment owned by STL and equipment on loan from E,G&G Ortec to perform the specific measurements while being hosted by STL personnel. Dr. Maier merely used equipment owned by LBNL to perform the specific measurements specified by me and provided the results of these measurements to me. Besides me, none of the other personnel involved in the work performed under either the WFO agreement or the DOE agreement (including Dr. Maier and the hosting STL personnel) contributed to the conception of the claimed invention of the above-captioned patent application.

25. I hereby declare that all statements made herein of my own knowledge are true, and that all statements made upon information and belief are believed to be true; and further, that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code, and that willful, false statements may jeopardize the validity of the application or any patent issuing thereon.

Appl. No. : 09/883,851
Filed : June 18, 2001

Dated: 11/17/05 By: _____
Bogdan C. Maglich, Ph.D.

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100405

Work for Others Agreement No. M97FIA614

Between

The United States Department of Energy

And

HiEnergy Microdevices, Inc.
10 Mauchly Drive
Irvine, CA
92618

List of Articles

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GENERAL TERMS AND CONDITIONS

Article I. PARTIES TO THE AGREEMENT

The U. S. Department of Energy, hereinafter referred to as "DOE" or "Government" has been requested by HiEnergy Microdevices, Inc., hereinafter referred to as the "Sponsor," to perform the work set forth in the Statement of Work, attached hereto as Appendix A. Such work will be performed by DOE through its M&O contractor, herein referred to as the "Contractor". It is understood by the Parties that, except for the intellectual property provisions of this Agreement, the Contractor is obligated to comply with the terms and conditions of its M&O contract with the United States Government represented by the United States Department of Energy when providing goods, services, products, processes, materials, or information to the Sponsor under this Agreement.

Article II. TERM OF THE AGREEMENT

The DOE estimated period of performance for completion of the Statement of Work is 2 months. The term of this Agreement shall be effective as of the date on which it is signed by the last of the Parties and shall continue for the estimated performance period.

Article III. COSTS

A. The DOE estimated cost for the work to be performed under this Agreement is $20,000.

B. DOE has no obligation to continue or complete performance of the work at a cost in excess of its estimated cost, including any subsequent amendment.

C. DOE agrees to provide at least 14 days' notice to the Sponsor if the actual cost to complete performance will exceed its estimated cost.

DOE's costs shall be determined in accordance with DOE's policy for costing work it performs for others as set forth in 10 CFR 1009. The estimated cost shall not operate as a cost limitation on the obligations and liabilities assumed by the Sponsor under other provisions of this Agreement.

Article IV. FUNDING AND PAYMENT

The Sponsor shall provide sufficient funds in advance to reimburse DOE for costs incurred by DOE in causing its management and operating contractor to perform the work described in this

Agreement, and DOE shall have no obligation to perform in the absence of adequate advance funds. The Sponsor will submit to the DOE an advance funding in the amount of the estimated cost stated in Article III.A. If the estimated period of performance exceeds 90 days or the estimated cost exceeds $25,000, the Sponsor may, with the DOE Contracting Officer's approval, advance funds incrementally. In such a case, DOE will initially invoice the Sponsor in an amount sufficient to permit the work to proceed for N/A days and thereafter invoice the Sponsor monthly so as to maintain approximately a 90-day period that is funded in advance. Payment shall be made directly to DOE. Upon termination or completion, any excess funds shall be refunded by DOE to the Sponsor.

Article V. SOURCE OF FUNDS

The Sponsor hereby warrants and represents that, if the funding it brings to this Agreement has been secured through other agreements, such other agreements do not have any terms and conditions (including intellectual property) that conflict with the terms of this Agreement.

Article VI. PROPERTY

Upon termination of this Agreement, property or equipment having a value greater than $5,000 produced or acquired in conducting the work under this Agreement shall be owned as follows: Owned by DOE. No Federal funds will be used to purchase property or equipment for this agreement. Property or equipment produced or acquired as part of this Agreement will be accounted for and maintained during the term of the Agreement in the same manner as Department property or equipment.

Article VII. PUBLICATION MATTERS:

No publicity releases (including new releases and advertising) relating to this Agreement and the work hereunder shall be issued by either party without prior coordination with the other party. The publishing Party shall provide the other Party a 10-day period in which to review and comment on proposed publications that either disclose technical developments and/or research findings generated in the course of this agreement, or identify Proprietary Information (as defined in paragraph 1.B of Article XV). The publishing Party shall not publish or otherwise disclose Proprietary Information identified by the other Party, except as provided by law. Any technical paper, article, publication, or announcement of advances generated in connection with work done under this Agreement, during the period of performance of the Agreement or in the future, shall give credit to the Sponsor as a sponsor of the work and shall contain DOE's standard publication disclaimer statement (copy furnished upon request).

Article VIII. LEGAL NOTICE

The Parties agree that the following legal notice shall be affixed to each report furnished to the Sponsor under this Agreement and to any report resulting from this Agreement which may be distributed by the Sponsor:

This report was prepared as an account of work sponsored by HiEnergy Microdevices, Inc. Neither the HiEnergy Microdevices, Inc., nor any of their employees, directors, officers, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completedness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

Article IX. DISCLAIMER

THE GOVERNMENT AND THE CONTRACTOR MAKE NO EXPRESS OR IMPLIED WARRANTY AS TO THE CONDITIONS OF THE RESEARCH OR ANY INTELLECTUAL PROPERTY, GENERATED INFORMATION, OR PRODUCT MADE OR DEVELOPED UNDER THIS WORK FOR OTHERS AGREEMENT, OR THE OWNERSHIP, MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE OF THE RESEARCH OR RESULTING PRODUCT; THAT THE GOODS, SERVICES, MATERIALS, PRODUCTS, PROCESSES, INFORMATION, OR DATA TO BE FURNISHED HEREUNDER WILL ACCOMPLISH INTENDED RESULTS OR ARE SAFE FOR ANY PURPOSE INCLUDING THE INTENDED PURPOSE; OR THAT ANY OF THE ABOVE WILL NOT INTERFERE WITH PRIVATELY OWNED RIGHTS OF OTHERS. NEITHER THE GOVERNMENT NOR THE CONTRACTOR SHALL BE LIABLE FOR SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES ATTRIBUTED TO SUCH RESEARCH OR RESULTING PRODUCT, INTELLECTUAL PROPERTY, GENERATED INFORMATION, OR PRODUCT MADE OR DELIVERED UNDER THIS WORK FOR OTHERS AGREEMENT.

Article X. GENERAL INDEMNITY

The Sponsor agrees to indemnify and hold harmless the Government, the Department, the Contractor, and persons acting on their behalf from all liability, including costs and expenses incurred, to any person, including the Sponsor, for injury to or death of persons or other living things or injury to or destruction of property arising out of the performance of the Agreement by the Government, the Department, the Contractor, or persons acting on their behalf, or arising out of the use of the services performed, materials supplied, or information given hereunder by any person including the Sponsor, and not directly resulting from the fault or negligence of the Government, the Department, the Contractor, or persons acting on their behalf.

Article XI. PRODUCT LIABILITY INDEMNITY

Except for any liability resulting from any negligent acts or omissions of the Government or the Contractor, the Sponsor agrees to indemnify the Government and the Contractor for all damages, costs, and expenses, including attorney's fees, arising from personal injury or property damage occurring as a result of the making, using, or selling of a product, process, or service by or on behalf of the Sponsor, its assignees, or licensees, which was derived from the work performed under this Work for Others Agreement. In respect to this Article, neither the Government nor the Contractor shall be considered assignees or licensees of the Sponsor, as a result of reserved Government and Contractor rights. The indemnity set forth in this paragraph shall apply only if the Sponsor shall have been informed as soon and as completely as practical by the Contractor and/or the Government of the action alleging such claim and Sponsor shall have been given an opportunity, to the maximum extent afforded by applicable laws, rules, or regulations, to participate in and control its defense, and the Contractor and/or Government shall have provided all reasonably available information and reasonable assistance requested by the Sponsor. No settlement for which the Sponsor would be responsible shall be made without the Sponsor's consent unless required by final decree of a court of competent jurisdiction.

Article XII. INTELLECTUAL PROPERTY INDEMNITY - LIMITED

The Sponsor shall indemnify the Government and the Contractor and their officers, agents, and employees against liability, including costs, for infringement of any United States patent, copyright, or other intellectual property arising out of any acts required or directed by the Sponsor to be performed under this Agreement to the extent such acts are not already performed at the facility. Such indemnity shall not apply to a claimed infringement that is settled without the consent of the Sponsor unless required by a court of competent jurisdiction.

Article XIII. NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT

The Sponsor shall report to the Department and the Contractor, promptly and in reasonable written detail, each claim of patent or copyright infringement based on the performance of this Agreement of which the Sponsor has knowledge. The Sponsor shall furnish to the Department and the Contractor, when requested by the Department or the Contractor, all evidence and information in the possession of the Sponsor pertaining to such claim.

Article XIV. PATENT RIGHTS - USE OF FACILITIES (CLASS WAIVER)

1. Definitions

A. "Subject Invention" means any invention or discovery of the Government, or, to the extent the Sponsor is performing any work under this Agreement, of the Sponsor, conceived in the course of or under this Agreement, or, in the case of an invention previously conceived by the Sponsor, first actually reduced to practice in the course of or under this Agreement. "Subject Invention" includes any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plant, whether patented under the Patent Laws of the United States of America or any foreign country, or unpatented.

B. "Patent Counsel" means the DOE Patent Counsel assisting the procuring activity which has the administrative responsibility for the facility where the work under this Agreement is to be performed.

2. Rights of the Sponsor; election to retain rights

Subject to the provisions of paragraph 3.B. with respect to any Subject Invention reported and elected in accordance with paragraph 4. of this article, the Sponsor may elect to obtain the entire right, title, and interest throughout the world to each Subject Invention and any patent application filed in any country on a Subject Invention and in any resulting patent secured by the Sponsor. Where appropriate, the filing of patent applications by the Sponsor is subject to DOE and other Government security regulations and requirements.

3. Rights of the Government

A. Assignment to the Government

The Sponsor agrees to assign to the Government, as requested, the entire right, title, and interest in any country to each Subject Invention of the Sponsor and to each Subject Invention of the Government, where the Sponsor:

(1) does not elect pursuant to this article to retain such rights; or

(2) elects to obtain title to a Subject Invention pursuant to paragraph 2. but fails to have a patent application filed in that country on the Subject Invention or decides not to continue prosecution or not to pay any maintenance fees covering the invention.

B. Terms and Conditions of Waived Rights

(1) To preserve the Government's residual rights to Subject Inventions, and in patent applications and patents on Subject Inventions, the Sponsor shall take all actions in reporting, electing, filing on, prosecuting, and maintaining invention rights promptly, but in any event, in sufficient time to satisfy domestic and foreign statutory and regulatory time requirements, or, if the Sponsor decides not to take appropriate steps to protect the invention rights, it shall notify the Government in sufficient time to permit the Government to file, prosecute, and maintain patent applications and any resulting patents prior to the end of such domestic or foreign statutory or regulatory time requirements.

(2) The Sponsor shall convey or ensure the conveyance of any executed instruments necessary to vest in the Government the rights set forth in this article.

(3) With respect to any Subject Invention in which the Sponsor obtains title, the Sponsor hereby grants to the Government a non-exclusive, nontransferable, irrevocable, paid-up license to practice or have practiced by or on behalf of the United States the Subject Invention throughout the world.

(4) The Sponsor shall provide the Government a copy of any patent application filed on a Subject Invention within 6 months after such application is filed, including its serial number and filing date.

(5) Preference for U.S. Industry. Notwithstanding any other provision of this article, the Sponsor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any Subject Invention in the United States unless such person agrees that any products embodying the Subject Invention or produced through the use of the Subject Invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by DOE upon a showing by the Sponsor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

(6) March-In Rights. The Sponsor agrees that with respect to any Subject Invention of the Contractor in which it has acquired title, DOE shall retain the right to require the Sponsor to grant a responsible applicant a nonexclusive, partially exclusive, or exclusive license to use the Subject Invention in any field of use, on terms that are reasonable under the circumstances, or if the Sponsor fails to grant such a license, to grant the license itself. DOE may exercise this right only in exceptional circumstances and only if DOE determines that:

(a) the action is necessary to meet health or safety needs that are not reasonably satisfied by the Sponsor; or

(b) the action is necessary to meet the requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by the Sponsor; or

(c) such action is necessary because a licensee of the exclusive right to use or sell any Subject Invention in the United States is in breach of the agreement required by paragraph 3.B.(5).

(7) The Sponsor agrees to refund any amounts received as royalty charges on any Subject Invention in procurement by or on behalf of the Government and to provide for that refund in any instrument transferring rights to any party in the invention.

(8) The Sponsor agrees to include, within the specification of any United States patent applications and any patent issuing thereon covering a Subject Invention, the following statement. "The Government has rights in this invention pursuant to (specify this underlying Agreement)."

4. <u>Invention Identification, Disclosures, and Reports</u>

A. The Sponsor shall furnish the Patent Counsel a written report containing full and complete technical information concerning each Subject Invention it makes within 6 months after conception or first actual reduction to practice, whichever occurs first, in the course of or under this Agreement, but in any event prior to any on sale, public use, or public disclosure of such invention known to the Sponsor. The report shall identify the contract and inventor and shall be sufficiently complete in technical detail and appropriately illustrated by sketch or diagram to convey to one skilled in the art to which the invention pertains a clear understanding to the extent known at the time of disclosure, of the nature, purpose, operation, and to the extent known, the physical, chemical, biological, or electrical characteristics of the invention.

The report should also include any election of invention rights under this article. When an invention is reported under this paragraph 4.A, it shall be presumed to have been made in the manner specified in Section (a)(1) and (2) of 42 USC 5908.

B. The Government shall report Subject Inventions it makes in accordance with the procedures set forth in contract DE-AC08-96NV11718. In addition, the Government shall disclose to the Sponsor at the same time as disclosure to the Department any Subject Inventions made by the Contractor under this Agreement and the Sponsor shall notify the Department within 6 months of receipt of such disclosure by the Sponsor of any election of patent rights under this article.

C. Requests for extension of time for election under subparagraphs A and B may be granted by Patent Counsel for good cause shown in writing.

5. Limitation of Rights

Nothing contained in this patent rights article shall be deemed to give the Government any rights with respect to any invention other than a Subject Invention except as set forth in the Facilities License of paragraph 6.

6. Facilities License

In addition to the rights of the Parties with respect to inventions or discoveries conceived or first actually reduced to practice in the course of or under this Agreement, the Sponsor agrees to and does hereby grant to the Government an irrevocable, non-exclusive, paid-up license in and to any inventions or discoveries regardless of when conceived or first actually reduced to practice or acquired by the Sponsor, which at any time, through completion of this Agreement, are owned or controlled by the Sponsor and are incorporated in the facility as a result of this Agreement to such an extent that the facility is not restored to the condition existing prior to the Agreement (1) to practice or to have practiced by or for the Government at the facility, and (2) to transfer such license with the transfer of the facility. The acceptance or exercise by the Government of the aforesaid rights and license shall not prevent the Government at any time from contesting the enforceability, validity, or scope of, or title to, any rights or patents herein licensed.

7. Early Termination of Agreement

The terms and conditions of this article shall survive the Agreement, in the event that the Agreement is terminated before completion of the Statement of Work.

~~[Article XIV. RESERVED]~~

~~If the Contractor will be retaining title to subject inventions, then the provisions of the prime contract will apply, and the above Patent Rights article should be deleted, and an appropriate reference to the applicability of the patent article of the prime contract should be included. If the Sponsor will be performing work and therefore will be retaining title to its own inventions, then the above Patent Rights article will be appropriately modified.~~

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Article XV. RIGHTS IN TECHNICAL DATA - USE OF FACILITY

1. The following definitions shall be used.

   A. "Generated Information" means information produced in the performance of this Agreement.

   B. "Proprietary Information" means information which is developed at private expense, is marked as Proprietary Information, and embodies (1) trade secrets or (2) commercial or financial information which is privileged or confidential under the Freedom of Information Act (5 USC 552 (b)(4)).

   C. "Unlimited Rights" means the right to use, disclose, reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, in any manner and for any purpose, and to have or permit others to do so.

2. The Sponsor agrees to furnish to the Contractor or leave at the facility that information, if any, which is (1) essential to the performance of work by the Contractor personnel or (2) necessary for the health and safety of such personnel in the performance of the work. Any information furnished to the Contractor shall be deemed to have been delivered with Unlimited Rights unless marked as Proprietary Information. The Sponsor agrees that it has the sole responsibility for appropriately identifying and marking all documents containing Proprietary Information, whether such documents are furnished by the Sponsor or produced under this Agreement and made available to the Sponsor for review.

3. The Sponsor may designate as Proprietary Information any Generated Information where such data would embody trade secrets or would comprise commercial or financial information that is privileged or confidential if it were obtained from the Sponsor. Such Proprietary Information will, to the extent permitted by law, be maintained in confidence and disclosed or used by the Contractor (under suitable protective conditions) only for the purpose of carrying out the Contractor's responsibilities under this Agreement. Upon completion of activities under this Agreement, such Proprietary Information will be disposed of as requested by the Sponsor.

Before the Contractor releases data associated with this Agreement to anyone, the Sponsor will be afforded the opportunity to review that data to ascertain whether it is Proprietary Information and to mark it as such.

4. The Government and Contractor agree not to disclose properly marked Proprietary Information to anyone other than the Sponsor without written approval of the Sponsor, except to Government employees who are subject to the statutory provisions against disclosure of confidential information set forth in the Trade Secrets Act (18 USC 1905). The Government and Contractor shall have the right, at reasonable times up to 3 years after the termination or completion of the Agreement, to inspect any information designated as Proprietary Information by the Sponsor, for the purpose of verifying that such information has been properly identified as Proprietary Information.

5. The Sponsor is solely responsible for the removal of all of its Proprietary Information from the facility by or before termination of this Agreement. The Government and Contractor shall have Unlimited Rights in any information which is not removed from the facility by termination of this Agreement. The Government and Contractor shall have Unlimited Rights in any Proprietary Information which is incorporated into the facility or equipment under this Agreement to such extent that the facility or equipment is not restored to the condition existing prior to such incorporation.

6. The Sponsor agrees that the Contractor will provide to the Department a nonproprietary description of the work performed under this Agreement.

7. The Government shall have Unlimited Rights in all Generated Information produced or information provided by the Parties under this Agreement, except for information which is disclosed in a Subject Invention disclosure being considered for patent protection, or which is marked as being Proprietary Information.

8. Copyrights. The Sponsor may assert copyright in any of its Generated Information, and may also require the Contractor, at the Sponsor's expense, to register copyright and assign copyright in any Generated Information produced by the Contractor which the Sponsor wishes to copyright. Subject to the other provisions of this article, and to the extent that copyright is asserted, the Government reserves for itself a royalty-free, world-wide, irrevocable, non-exclusive license for Governmental purposes to publish, distribute, translate, duplicate, exhibit, prepare derivative works, and perform any such data assigned to the Sponsor.

9. The terms and conditions of this article shall survive the Agreement, in the event that the Agreement is terminated before completion of the Statement of Work.

~~**Options:**~~

3. The Sponsor, Contractor, and the Government shall have Unlimited Rights in all Generated Information, except for information which is disclosed in a Subject Invention disclosure being considered for patent protection.

4. The Government agrees not to disclose properly marked Proprietary Information without written approval of the Sponsor, except to Government employees who are subject to the statutory provisions against disclosure of confidential information set forth in the Trade Secrets Act (18 U.S.C. 1905).

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5. The Sponsor is solely responsible for the removal of all of its Proprietary Information from the facility by or before termination of this Agreement. The Government shall have Unlimited Rights in any Proprietary Information which is incorporated into the facility or equipment under this Agreement to such an extent that the facility or equipment is not restored to the condition existing prior to such incorporation. The U.S. Government shall have unlimited rights in any information ~~which is not removed from the facility by termination of this Agreement.~~

Article XVI. ASSIGNMENT

Neither this Agreement nor any interest therein or claim thereunder shall be assigned or transferred by either Party, except as authorized in writing by the other Party to this Agreement.

Article XVII. SIMILAR OR IDENTICAL SERVICES

The Government and/or Contractor shall have the right to perform similar or identical services in the Statement of Work (SOW) for other Sponsors as long as the Sponsor's Proprietary Information is not utilized.

Article XVIII. EXPORT CONTROL

Each Party is responsible for its own compliance with laws and regulations governing export control.

Article XIX. TERMINATION

Performance of work under this Agreement may be terminated at any time by either Party, without liability, except as provided above, upon giving a 30-day written notice to the other Party.

The Government shall terminate this Agreement only when such termination is in the best interest of the Government, provided however, that the Government shall have the right to terminate if the Sponsor shall have failed to advance the funds required by Article IV. In the event of termination, the Sponsor shall be responsible for the Government's costs (including closeout costs), through the effective date of termination, but in no event shall the Sponsor's cost responsibility exceed the total cost to the Sponsor as described in Article III, above.

It is agreed that any obligations of the Parties regarding Proprietary Information or other intellectual property will remain in effect, despite early termination of the Agreement.

Article XX. NON-INTERFERENCE

The use of a DOE facility and/or its management and operating contractor personnel in support of this Agreement can only be authorized on a noninterference basis, i.e., the work performed under this Agreement shall not interfere with work related to the prime mission of the facility. Although DOE commitment to this effort is equal to DOE mission programs, DOE programs may, for reasons related to national security or exigency, preempt efforts in support of this Agreement. Accordingly, neither the Government, DOE, the management and operating contractor, nor persons acting on their behalf will be responsible, irrespective of causes, for failure to perform services or furnish information or data hereunder at any particular time or in any specific manner.

Article XXI. ALTERNATE DISPUTE RESOLUTION (Optional)

The Parties to this Agreement are encouraged to utilize the processes of Alternative Dispute Resolution (ADR) to settle any differences that may arise during the performance of this Agreement, although it is not mandatory that they do so. As a starting point, the language below is suggested.

Step 1. NEGOTIATION

The Parties shall attempt in good faith to resolve any dispute arising out of or relating to this Agreement by negotiating between executives and/or officials who have authority to settle the controversy and who are at a higher level of management than the persons with direct responsibility for administration of this contract. Either Party may give the other Party written notice of any dispute not resolved in the normal course of business. Within 15 days after delivery of the notice, the receiving Party shall submit to the other a written response. The notice and the response shall include (a) a statement of each Party's position and a summary of arguments supporting that position, and (b) the name and title of the executive or official who will represent that Party and of any other person(s) who will accompany the executive or official.

Within 30 days after delivery of the disputing Party's notice, the executives of both Parties shall meet at a mutually acceptable time and place, and thereafter as often as they reasonably deem necessary, to attempt to resolve the dispute. All reasonable requests for information made by one party to the other will be honored.

If the matter has not been resolved within 60 days of the disputing Party's notice, or if the Parties fail to meet within 30 days, either party may (or, "the Parties shall" . . ., if you want it to be mandatory) initiate mediation of the controversy or claim as provided hereafter.

All negotiations pursuant to this Agreement are confidential and shall be treated as compromise and settlement negotiations for purposes of the Federal Rules of Evidence and state rules of evidence.

Step 2. MEDIATION

In the event the dispute has not been resolved by negotiation as provided herein, the Parties agree to participate in ("at least 4 hours of", if you want to limit time, sometimes an inducement to busy officials) mediation, using a mutually agreed upon mediator. The mediator will not render a decision, but will assist the Parties in reaching a mutually satisfactory agreement.

The Parties agree to equally split the costs of the mediation. The first mediation session shall commence within 30 days from agreement. The Parties may contact the DOE Office of Dispute Resolution with questions or for assistance with selection of neutrals or samples of Agreements to Mediate.

All meditations are confidential and shall be treated as compromise and settlement negotiations for purposes of the Federal Rules of Evidence and state rules of evidence.

NOTE: The new confidentiality provisions under the revised Administrative Dispute Resolution Act provide much stronger protection and can be incorporated in any agreement as soon as it is passed.

Step 3. ARBITRATION

Any dispute not otherwise satisfactorily resolved (shall) may be submitted to arbitration, pursuant to the Administrative Dispute Resolution Act (new cite, not yet available), through the (American Arbitration Association, Jams/Endispute Center for Public Resources, United States Arbitration and Mediation, or other reputable ADR provider).

NOTE: Since arbitration, unlike mediation, results in a binding decision by the neutral, it may be useful to hire an outside provider such as those listed above, to assist in arbitrator selection and to provide rules for the arbitration. If the Parties can agree on the arbitrator, they must still agree on the rules of the arbitration.

Generally, it is best to limit the time and scope of the arbitration, or it will quickly resemble a trial. Factors to consider include capping the award by agreeing to "high-low" or "baseball" figures, and limiting the duration of the hearing, the number of witnesses, and the amount of evidence to be presented.

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Wayne B. Miller

Name Wayne B. Miller
Contracting Officer

Title Contracting Officer

Date 9/30/97

FOR Sponsor:

Signature

Name: David Sereda

Title: President, HiEnergy Microdevices, Inc.

Date: 9/8/97

APPENDIX A

STATEMENT OF WORK

"MineBuster" Activity

The Contractor, Bechtel Nevada Special Technologies Laboratory, will perform the following unclassified task:

Measure the gamma response of various neutron activated elements and combinations of elements that are important to mine detection in typical soils. Determine detection sensitivities of pertinent elements in soils under a variety of experimental conditions such as moisture content.

Analyze the results and write an informal summary report.

Estimated cost:

Labor	$ 14,552.00
Misc. Materials and Supplies	$ 448.00
TOTAL	$ 15,000.00
DOE Adders (rounded up to nearest $100)	$ 5,000.00
GRAND TOTAL	$ 20,000.00

Estimated completion date:

December 13, 1997

Amendment No. 1

to the

Work for Others Agreement No. M97FIA608

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article II is hereby amended to extend the DOE estimated period of performance for completion to March 31, 1998.

Article III is hereby amended to increase the estimated cost of $20,000.00 by $10,000.00 for a new estimated cost of $30,000.00.

Appendix A, is hereby amended to revise the Estimated completion date to March 31, 1998 and the Estimated cost as follows:

Labor	$	29,000.00
Misc. Materials and Supplies	$	1,000.00
TOTAL	$	30,000.00
DOE Adders (rounded up to nearest $100)	$	0.00
GRAND TOTAL	$	30,000.00

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Wayne B. Miller

Name ~~Wayne B. Miller~~

Title Contracting Officer

Date 1-20-98

FOR Sponsor:

Signature

Name David Sereda

Title President

Date Jan 13, 1998

Amendment No. 2

to the

Work for Others Agreement No. M97FIA6014

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article II is hereby amended to extend the DOE estimated period of performance for completion to April 30, 1998.

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:	**FOR Sponsor:**
Signature Raymon D. Cox	Signature Frank Handler
Name **Raymon D. Cox**	Name Frank Handler
Title **Contracting Officer**	Title Executive Vice President
Date **April 7, 1998**	Date 4-2-98

Amendment No. 3

to the

Work for Others Agreement No. M97FIA614

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article II is hereby amended to extend the DOE estimated period of performance for completion to June 30, 1998.

Article III is hereby amended to increase the estimated cost of $30,000.00 by $10,000.00 for a new estimated cost of $40,000.00.

Appendix A is hereby amended to revise the Estimated completion date to June 30, 1998 and the Estimated cost as follows:

Labor	$	38,717.00
Misc. Materials and Supplies	$	1,283.00
TOTAL	$	40,000.00
DOE Adders (rounded up to nearest $100)	$	0.00
GRAND TOTAL	$	40,000.00

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Wayne B. Miller

Name Wayne B. Miller
Contracting Officer

Title

Date 5/1/98

FOR Sponsor:

Signature Frank Handler

Name FRANK HANDLER

Title Executive Vice President

Date 4-29-98

Amendment No. 4

to the

Work for Others Agreement No. M97FIA614

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article II is hereby amended to extend the DOE estimated period of performance for completion to January 31, 1999.

Appendix A is hereby amended to revise the Estimated completion date to January 31, 1999 and the Estimated cost as follows:

Labor	$	38,717.00
Misc. Materials and Supplies	$	1,283.00
TOTAL	$	40,000.00
DOE Adders (rounded up to nearest $100)	$	0.00
GRAND TOTAL	$	40,000.00

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Beverly A Colbert

Name Beverly A. Colbert

Title Contracting Officer

Date 12-2-98

FOR HiEnergy Microdevices, Inc.:

Signature

Name Kian Kani

Title President

Date December 1, 1998

Amendment No. 5

to the

Work for Others Agreement No. M97FIA614

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article II is hereby amended to extend the DOE estimated period of performance for this agreement to September 30, 2002.

Article III is hereby amended to increase the estimated cost of $40,000.00 by $10,000.00 for a new estimated cost of $50,000.00.

Appendix A is hereby amended to add an additional task, to revise the estimated completion date of the current work, and to revise the total estimated cost as follows:

The Contractor, Bechtel Nevada / Special Technologies Laboratory, will perform the following unclassified task entitled "Material Detection via Gamma Response":

Measure the gamma response of various materials and combinations of materials using a neutron beam from Sealed Tube Neutron Generator (STNG) tube. Determine detection sensitivities of pertinent materials under a variety of experimental conditions.

Analyze these results and write an informal summary report.

Estimated cost:

	PRIOR CONTRACT TOTAL	CHANGE	REVISED CONTRACT TOTAL
Labor	$ 38,717.00	$ 9,595.00	$ 48,312.00
Misc. Materials and Supplies	$ 1,283.00	$ 405.00	$ 1,688.00
TOTAL	$ 40,000.00	$ 10,000.00	$ 50,000.00
DOE Adders	$ 0.00	$ 0.00	$ 0.00
GRAND TOTAL	$ 40,000.00	$ 10,000.00	$ 50,000.00

Estimated completion date:

September 30, 2001

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:	**FOR HiEnergy Microdevices, Inc.:**
Signature Darby A. Dieterich	Signature
Name Darby A. Dieterich	Name ULRICH BÜGGELN
Title Contracting Officer	Title President
Date 9/20/00	Date Sept 20/2000

Amendment No. 6

to the

Work for Others Agreement No. M97FIA614

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article III is hereby amended to increase the estimated cost of $50,000.00 by $5,000.00 for a new estimated cost of $55,000.00.

Appendix A is hereby amended to revise the total estimated cost as follows:

Estimated cost:

	PRIOR CONTRACT TOTAL	CHANGE	REVISED CONTRACT TOTAL
Labor	$ 48,312.00	$ 4,801.00	$ 53,113.00
Misc. Materials and Supplies	$ 1,688.00	$ 77.00	$ 1,765.00
TOTAL	$ 50,000.00	$ 4,878.00	$ 54,878.00
DOE Federal Admin. Charge	$ 0.00	$ 0.00	$ 0.00
Security Allowance	$ 0.00	$ 122.00	$ 122.00
GRAND TOTAL	$ 50,000.00	$ 5,000.00	$ 55,000.00

Estimated completion date:

September 30, 2001

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Beverly A Colbert

Name Beverly A. Colbert

Title Contracting Officer

Date 11/7/00

FOR HiEnergy Microdevices, Inc.:

Signature B C Maglich

Name B. C. MAGLICH

Title CHAIRMAN

Date 11/2/00

Amendment No. 7

to the

Work for Others Agreement No. M97FIA614

This Amendment is made to the Work for Others Agreement between the U.S. Department of Energy and HiEnergy Microdevices and is effective upon the signature of the representative of the Department of Energy.

Article III is hereby amended to decrease the estimated cost of $55,000.00 by $3,057.02 for a new estimated cost of $51,942.98.

Article IV is hereby amended by adding "Funds in excess of the an individual task will be refunded to the sponsor. At the direction of the sponsor, the excess funds from the task may be retained by DOE and used to fund subsequent tasks." prior to the last sentence in the article.

Appendix A is hereby amended to revise the total estimated cost as follows:

Estimated cost:

	PRIOR CONTRACT TOTAL	CHANGE	REVISED CONTRACT TOTAL
Labor	$ 53,113.00	$ (2,935.02)	$ 50,177.98
Misc. Materials and Supplies	$ 1,765.00	$ 0.00	$ 1,765.00
TOTAL	$ 54,878.00	$ (2,935.02)	$ 51,942.98
DOE Federal Admin. Charge	$ 0.00	$ 0.00	$ 0.00
Security Allowance	$ 122.00	$ (122.00)	$ 0.00
GRAND TOTAL	$ 55,000.00	$ (3,057.02)	$ 51,942.98

In witness whereof, the Parties hereto have executed this Agreement.

FOR United States Department of Energy:

Signature Beverly A Colbert

Name Beverly A Colbert

Title Contracting Officer

Date 1/29/01

FOR HiEnergy Microdevices, Inc.:

Signature Cherise MacPherson

Name Cherise MacPherson

Title Vice President

Date 01-26-01

AGREEMENT
BETWEEN
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
AS MANAGEMENT AND OPERATION CONTRACTOR OF
THE E. O LAWRENCE BERKELEY NATIONAL LABORATORY
AND
HIENERGY MICRODEVICES, INC.

I. INTRODUCTION

The Regents of the University of California (University) and the United States Government (Government) represented by the United States Department of Energy (DOE) have entered into Contract No. DE-AC03-76SF00098, which provides that the University will undertake certain research and development work for the Government in the field of energy at the Government-owned E. O Lawrence Berkeley National Laboratory (LBNL). This Agreement is entered into by and between The Regents of the University of California (University) as Management and Operation Contractor of the E. O Lawrence Berkeley National Laboratory and HiEnergy Microdevices Inc. (hereafter "Sponsor") in order that the work described in the attached Statement of Work, be performed. (Attachment A). DOE has authorized the University to execute this Agreement for work at LBNL.

II. TERM AND TERMINATION

The term of this Agreement shall begin on the latter of the final date of execution or receipt of the advance payment, if required under Article III, and shall continue for a period of THREE(3) months. Services under this Agreement may be terminated at any time by either party by providing 30-day written notice to the other party. In the event the Agreement is terminated by the University, the Sponsor shall bear the costs of services incurred prior to the effective date of termination unless such charges have been waived by the University. If the agreement is terminated by the Sponsor, the Sponsor shall bear the cost of services incurred by the University prior to the effective date of termination unless such charges have been waived.

III. COST

Except to the extent charges have been waived by DOE, the Sponsor shall pay DOE in advance for work performed hereunder on the basis of the DOE's full cost recovery policy in effect as of the date of this Agreement. Neither the Government, DOE, the University, nor persons acting on their behalf guarantee the correctness of any estimate of cost for the performance of work and there shall be no liability on the part of the Government, DOE, the University, or persons acting on their behalf by reasons of errors in the computation of estimates or differences between such estimates and the actual cost of the work. Billing, if any, will be made monthly by the University, in accordance with LBNL's established billing procedures. Payment shall be made within thirty days of receipt of invoice. Estimated cost of the work contemplated is $6,254. A full advance payment in the amount of $6,254 will be paid by Sponsor upon final execution of this Agreement.

IV. SCOPE OF WORK - COORDINATION AND ADMINISTRATION

Except as otherwise advised by DOE, technical contact will be between representatives of the Sponsor and of the University who will agree in writing upon the specific services to be provided to the Sponsor.

By entering into this Agreement, the Sponsor certifies that these services cannot be procured reasonably and expeditiously by it through ordinary business channels.

NOTE: The University, the Sponsor and the Government agree that the mutual obligations of the Parties created by Clauses V, VI, VII, and VIII constitute a contract between the Sponsor and the U.S. Government, as represented by the Department of Energy, with respect to the intellectual property matters covered by those Clauses.

V. PATENT RIGHTS - USE OF FACILITIES (CLASS WAIVER)

A. Definitions

(1) "Sponsor" means the person or entity with which this agreement is made.

(2) "Subject Invention" means any invention or discovery of the Facility Operator or, to the extent the Sponsor is performing any work under this agreement, of the Sponsor, conceived in the course of or under this agreement, or, in the case of an invention previously conceived by the Sponsor, first actually reduced to practice in the course of or under this agreement. "Subject Invention" includes any art, method, process, machine, manufacture, design or composition of matter, or any new and useful improvement thereof, or any variety of plants, whether patented or unpatented under the Patent Laws of the United States of America or any foreign country.

(3) "Facility Operator" means the operating contractor which manages and operates the Government-owned, contractor-operated facility where work under this agreement is to be performed.

(4) "Patent Counsel" means the DOE Patent Counsel assisting the procuring activity which has the administrative responsibility for the facility where work under this agreement is to be performed.

B. Rights of the Sponsor

Election to retain rights. Subject to the provisions of paragraph C.(2) of this clause with respect to any Subject Invention reported and elected in accordance with paragraph D. of this clause, the Sponsor may elect to obtain the entire right, title and interest throughout the world to each Subject Invention and any patent application filed in any country on a Subject Invention and in any resulting patent secured by the Sponsor. Where appropriate, the filing of patent applications by the Sponsor is subject to DOE security regulations and requirements.

C. Rights of Government

(1) Assignment to the Government

The Sponsor agrees to assign to the Government, upon request, the entire right, title, and interest in any country to each Subject Invention of the Sponsor and to each Subject Invention of the Facility Operator to which the Sponsor has acquired title, where the Sponsor:

(a) Does not elect pursuant to this clause to retain such rights; or

(b) Elects to obtain title to a Subject Invention pursuant to paragraph B. of this clause but fails to have a patent application filed in that country on the Subject Invention or decides not to continue prosecution or not to pay any maintenance fees covering the invention; or

(c) Elects to obtain title to a Subject Invention pursuant to paragraph B. of this clause but at any time, the Sponsor no longer desires to retain title.

(2) Terms and Conditions of Waived Rights

(a) To preserve the Government's residual rights to Subject Inventions, and in patent applications and patents on Subject Inventions, the Sponsor shall take all actions in reporting, electing, filing on, prosecuting and maintaining invention rights promptly, but in any event, in sufficient time to satisfy domestic and foreign statutory and regulatory time requirements, or, if the Sponsor decides not to take appropriate steps to protect the invention rights, it shall notify DOE in sufficient time to permit the Government to file, prosecute and maintain patent applications and any resulting patents prior to the end of such domestic or foreign statutory or regulatory time requirements.

(b) The Sponsor shall convey or assure the conveyance of any executed instruments necessary to vest in the Government the rights set forth in this clause.

(c) With respect to any Subject Invention in which the Sponsor retains title, the Sponsor hereby grants to the Government a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the Subject Invention throughout the world.

(d) The Sponsor shall provide the Government a copy of any application filed on a Subject Invention within 6 months after such application is filed, including its serial number and filing date.

(e) The Sponsor agrees to submit on request periodic reports, no more frequently than annually, on the utilization of a Subject Invention or on efforts at obtaining such utilization that are being made by the Sponsor or its licensees or assignees. Such reports shall include

information regarding the status of development, date of first commercial sale or use, gross royalties received by the Sponsor, and such other data and information as DOE may reasonably specify. The Sponsor also agrees to provide additional reports as may be requested by DOE in connection with any march-in proceeding undertaken by DOE in accordance with paragraph C.(2)(g) of this clause. To the extent data or information supplied under this paragraph is considered by the Sponsor, its licensee or assignee to be privileged and confidential and is so marked, DOE agrees that, to the extent permitted by 35 USC 202(c)(5), it will not disclose such information to persons outside the Government.

(f) Preference for U. S. Industries. Notwithstanding any other provision of this clause, the Sponsor agrees that neither it nor any assignee will grant to any person the exclusive right to use or sell any Subject Invention in the United States unless such person agrees that any products embodying the Subject Invention or produced through the use of the Subject Invention will be manufactured substantially in the United States. However, in individual cases, the requirement for such an agreement may be waived by DOE upon a showing by the Sponsor or its assignee that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the United States or that under the circumstances domestic manufacture is not commercially feasible.

(g) March-In Rights. The Sponsor agrees that with respect to any Subject Invention in which it has acquired title, DOE has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of DOE to require the Sponsor, an assignee or exclusive licensee of a Subject Invention to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if the Sponsor, assignee, or exclusive licensee refuses such a request, DOE has the right to grant such a license itself if DOE determines that:

1. Such action is necessary because the Sponsor or assignee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of the Subject Invention in such field of use;

2. Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by the Sponsor, assignee, or their licensees;

3. Such action is necessary to meet requirements for public use specified by federal regulations and such requirements are not reasonably satisfied by the Sponsor, assignee, or licensees; or

4. Such action is necessary because the agreement required by paragraph C.(2)(f) of this clause has not been obtained or waived or because a licensee of the exclusive right to use or

sell any Subject Invention in the United States is in breach of such agreement.

(h) The Sponsor agrees to refund any amounts received as royalty charges on any Subject Invention in procurement for or on behalf of the Government and to provide for that refund in any instrument transferring rights to any party in the invention.

(i) The Sponsor agrees to include, within the specification of any United States patent applications and any patent issuing thereon covering a subject invention, the following statement: "The Government has rights in this invention pursuant to (specify the underlying agreement)."

D. Invention Identification, Disclosures, and Reports

(1) The Sponsor shall furnish the Patent Counsel a written report containing full and complete technical information concerning each Subject Invention it makes within 6 months after conception or first actual reduction to practice, whichever occurs first, in the course of or under this contract, but in any event prior to any on sale, public use or public disclosure of such invention known to the Sponsor. The report shall identify the contract and inventor and shall be sufficiently complete in technical detail and appropriately illustrated by sketch or diagram to convey to one skilled in the art to which the invention pertains a clear understanding to the extent known at the time of disclosure, of the nature, purpose, operation, and to the extent known, the physical, chemical, biological, or electrical characteristics of the invention. The report shall also include any election of patent rights under this clause. When an invention is reported under this paragraph D., it shall be presumed to have been made in the manner specified in Section (a)(1) and (2) of 42 USC 5908.

(2) The Facility Operator shall report Subject Inventions it makes in accordance with the procedures set forth in Contract DE-AC03-76SF00098. In addition, the Facility Operator shall disclose to the Sponsor at the same time as disclosure to DOE any Subject Inventions made by the Facility Operator under this agreement and the Sponsor shall notify DOE within 6 months of receipt of such disclosure by the Sponsor of any election of patent rights under this clause.

(3) Requests for extension of time for election under subparagraphs (1) and (2) may be granted by Patent Counsel for good cause shown in writing.

E. Limitation of Rights

Nothing contained in this patent rights clause shall be deemed to give the Government any rights with respect to any invention other than a Subject Invention except as set forth in the Facilities License of paragraph F.

F. Facilities License

In addition to the rights of the parties with respect to inventions or discoveries conceived or first actually reduced to practice in the course of or under this contract,

the Sponsor agrees to and does hereby grant to the Government an irrevocable, nonexclusive paid-up license in and to any inventions or discoveries regardless of when conceived or actually reduced to practice or acquired by the Sponsor, which at any time through completion of this contract are owned or controlled by the Sponsor and are incorporated in the facility as a result of this agreement to such an extent that the facility is not restored to the condition existing prior to the agreement (1) to practice or to have practiced by or for the Government at the facility, and (2) to transfer such license with the transfer of that facility. The acceptance or exercise by the Government of the aforesaid rights and license shall not prevent the Government at anytime from contesting the enforceability, validity or scope of, or title to, any rights or patents herein licensed.

G. Rights subject to another Federal agreement

The intellectual property rights acquired by the Sponsor under this Agreement shall also be subject to any additional terms and conditions of any other agreement, contract, grant or arrangement with the Federal government for which the Sponsor or its employee(s) receive(s) funding support or approval for the work performed under this Agreement.

VI. PATENT AND COPYRIGHT INDEMNITY - LIMITED

The Sponsor shall indemnify the Government and the Facility Operator and their officers, agents, and employees against liability, including costs, for infringement of any United States patent or copyright arising out of any acts required or directed by the Sponsor to be performed under the agreement to the extent such acts are not normally performed at the facility. Further, the foregoing indemnity shall not apply unless the Sponsor shall have been informed in a reasonable time by the Facility Operator or Government of the suit or action alleging such infringement, and such indemnity shall not apply to a claimed infringement which is settled without the consent of the Sponsor unless required by a court of competent jurisdiction.

VII. RIGHTS IN TECHNICAL DATA - USE OF FACILITY

A. Definitions

(1) "Technical Data" means recorded information, regardless of form or characteristic, of a scientific or technical nature. It may, for example, document research, experimental, developmental, demonstration, or engineering work to be usable or used to define a design or process or to procure, produce, support, maintain, or operate material. The data may be graphic or pictorial delineations in media such as drawings or photographs, text in specifications or related performance or design type documents, or computer software (including computer programs, computer software data bases, and computer software documentation). Examples of Technical Data include research and engineering data, engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identification and related information. Technical Data as used herein does not include financial reports, cost analyses, and other information incidental to contract administration.

(2) "Proprietary Data" means Technical Data which embody trade secrets developed at private expense outside of this Agreement, such as design procedures or techniques, chemical composition of materials, or manufacturing methods, processes, or treatments, including minor modifications thereof, provided that such data:

(a) Are not generally known or available from other sources without obligation concerning their confidentiality,

(b) Have not been made available by the owner to others without obligation concerning their confidentiality, and

(c) Are not already available to the Government without obligation concerning their confidentiality.

(3) "Unlimited Rights" means rights to use, duplicate or disclose Technical Data, in whole or in part, in any manner and for any purpose whatsoever, and to permit others to do so.

B. The Sponsor agrees to furnish to DOE or the Facility Operator those data, if any, which are (1) essential to the performance of work by DOE or Facility Operator personnel or (2) necessary for the health and safety of such personnel in the performance of the work. Any data furnished to DOE or the Facility Operator shall be deemed to have been delivered with Unlimited Rights unless marked as "proprietary data" of the Sponsor.

C. All Technical Data produced in the performance of work under this agreement by DOE or the Facility Operator shall, prior to any dissemination, publication, or further disclosure of the data by or on behalf of DOE, be made available to the Sponsor for review and appropriate marking where such data disclose the Sponsor's Proprietary Data.

(1) The Sponsor agrees that it has the sole responsibility for appropriately identifying and marking all documents containing Proprietary Data, whether such documents are furnished by the Sponsor or produced under the agreement and made available to the Sponsor for review.

(2) The Sponsor will mark all documents produced under this agreement by or before termination of the agreement by placing on the cover page thereof a legend identifying the document as Proprietary Data of the Sponsor and identifying each page and portion thereof to which the marking applies.

(3) The Government has the right to challenge the proprietary nature of any markings on data.

D. The Government shall not disclose properly marked Proprietary Data of the Sponsor outside the Government and the Facility Operator.

E. The Sponsor is solely responsible for the removal of all its Proprietary Data from the facility by or before termination of this agreement. The Government shall have Unlimited Rights, including the right to require delivery and publication, in all Technical Data first produced or specifically used in the performance of work under this Agreement (including Proprietary Data which are not removed from the facility by or before termination of the agreement). The Government shall have Unlimited

Rights in any Technical Data (including Proprietary Data) which are incorporated into the facility or equipment under the agreement to such extent that the facility or equipment is not restored to the condition existing prior to such incorporation. Additionally, the Government shall have the unlimited right to perform similar or identical services for other sponsors as long as the Sponsor's Proprietary Data are not utilized.

F. The Sponsor agrees to deliver to DOE a nonproprietary description of the work performed under the agreement.

VIII. NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT

A. The Sponsor shall report to the Government, promptly and in reasonable written detail, each notice or claim of patent or copyright infringement based on the performance of this agreement of which the Sponsor has knowledge.

B. In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this agreement or out of the use of any supplies furnished or work or services performed hereunder, the Sponsor shall furnish to the Government when requested by the Government, all evidence and information in possession of the Sponsor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Sponsor has agreed to indemnify the Government.

IX. INTELLECTUAL PROPERTY OBLIGATIONS

The Parties agree that any title or licenses, which are to be granted under the Patent Rights and/or Data Rights clauses or issued under a separate agreement or appendix, in and to intellectual property developed during performance of work under this Agreement, shall be subject to the following obligations:

A. Product Liability

Except for any liability resulting from any negligent or intentional acts or omissions of University, Sponsor agrees to indemnify the Government and the University for all damages, costs and expenses, including attorney's fees, arising from personal injury or property damage occurring as a result of the making, using or selling of a product, process or service by or on behalf of the Sponsor, its assignees or licensees, which was derived from the work performed under this Agreement. In respect to this Article, neither the Government nor the University shall be considered assignees or licensees of the Sponsor, as a result of reserved Government and University rights. The indemnity set forth in this paragraph shall apply only if Sponsor shall have been informed as soon and as completely as practical by the Contractor and/or the Government of the action alleging such claim and shall have been given an opportunity, to the extent afforded by applicable laws, rules, or regulations, to participate in and control its defense, and the University and/or Government shall have provided reasonably available information and reasonable assistance requested by Sponsor. No settlement for which Sponsor would be responsible shall be made without Sponsor's consent unless required by final decree of a court of competent jurisdiction.

B. Export Control

The Parties understand that materials and information resulting from the performance of this Agreement may be subject to export control laws and that each party is responsible for its own compliance with such laws.

X. INDEMNITY

Neither the Government, DOE, the University, nor persons acting on their behalf will be responsible for any injury to or death of persons or other living things or damage to or destruction of property or for any other loss, damage or injury of any kind whatsoever resulting from the performance of services or furnishings of materials hereunder.

The University will use its best efforts to perform the scope of work identified as Attachment A; however, neither the Government, DOE, the University, nor persons acting on their behalf makes any warranty, express or implied (1) with respect to the accuracy, completeness or usefulness of any information furnished hereunder, (2) that the use of any such information may not infringe privately-owned rights, (3) that the services, materials or information furnished hereunder will not result in injury or damage when used for any purpose, or (4) that the services, materials or information furnished hereunder will accomplish the intended results or are safe for any purpose including the intended purpose.

Neither the Government, DOE, the University, nor persons acting on their behalf will be responsible, irrespective of causes, for failure to perform the services or furnish the materials or information hereunder.

The Sponsor agrees to indemnify and save harmless the Government, DOE, the University, and persons acting on their behalf from:

A. all liability, including costs and expenses incurred, resulting from the Sponsor's use or disclosure of any information in whatever form, furnished hereunder, and

B. all liability to any person including the Sponsor for injury to or death of persons or other living things or injury to or destruction of property,

(1) arising out of performance by the Government, DOE, the University, or persons acting on their behalf, and not directly resulting from the fault or negligence of the Government, DOE, the University, or persons acting on their behalf; or

(2) arising out of the use of the services performed, materials supplied, or information given hereunder by any person including the Sponsor.

The foregoing provisions shall have no application to public liability for nuclear incident as defined and provided for in the Atomic Energy Act of 1954, as amended.

XI. ENVIRONMENTAL PROTECTION, HEALTH AND SAFETY

Full responsibility for the conduct and safety of Sponsor's personnel at the University's sites during the performance of the work shall be and remain with Sponsor. Sponsor shall maintain Workers' Compensation Insurance at levels sufficient to cover its obligations under this Agreement. While at the University's sites, the Sponsor's personnel are responsible for and shall take all reasonable precautions in the performance of their work

under this Agreement to protect the environment and the safety and health of employees and members of the public and shall comply with all applicable environmental health, and safety regulations and requirements of LBNL. In accordance with Chapter 24, "Environmental Health and Safety Training", of LBNL's Publication 3000, "Health and Safety Manual", environmental health and safety orientation and training shall be obtained by Sponsor's personnel at the earliest possible time upon arrival at the University's site (within 30 days) and in all cases before they work unsupervised or are exposed to any special hazards.

XII. INCORPORATION BY REFERENCE

The following standard Government clauses are incorporated herein by reference of appropriate sections of the Federal Acquisition Regulations and apply as if set forth herein in full:

Convict Labor	FAR52.222-3 (APR 1984)
Covenant Against Contingent Fees	FAR52.203-5 (APR 1984)
Equal Opportunity	FAR52.222-26 (APR 1984)
Officials Not to Benefit	FAR52.203-1 (APR 1984)
Contract Work Hours and Safety Standards Act - Overtime Compensation	FAR52.222-4 (MAR 1986)

In witness whereof the parties hereto have executed this Agreement.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, AS MANAGEMENT AND OPERATION CONTRACTOR OF THE LAWRENCE BERKELEY NATIONAL LABORATORY

By: Nancy Saxer

Name: NANCY SAXER

Title: CONTRACTS OFFICER

Date: April 28, 1997

HIENERGY MICRODEVICES, INC.

By: David Sereda

Name: David Sereda

Title: Vice President

Date: March 5, 1997

Statement of Work

Title: Minebuster - SBIR Phase I
BG No. 97-077(00)
Principal Investigator: Michael R. Maier
Sponsor: HiEnergy Microdevices, Inc.
Period of Performance: January 6, 1997 through March 17, 1997

Determine by laboratory measurements the dependence of gamma energy resolution of the N-type (neutron resilient) High Purity Germanium Detectors (HPGD) at the extremely high counting rate as a function of throughput in gamma counting rate using high-intensity Cobalt-60 source, and as a function of shaping time (from 10 to 2 microseconds). HPGD to be used is 80% efficient, 70 mm diameter, 80 mm long.

Determine by laboratory tests the stability of gamma energy "window" of the same HPGD at the extremely high counting rate as a function of throughput in gamma counting rate.

Determine by laboratory tests changes by absorption of gamma ray peaks in passage through 20 cm of soil (land mine depth).